(nondeterministic assignment) Generalize the assignment notation $x := e$ to allow the expression $e$ to be a bunch, with the meaning that $x$ is assigned an arbitrary element of the bunch. For example, $x := \text{nat}$ assigns $x$ an arbitrary natural number. Show the standard binary notation for this form of assignment. Show what happens to the Substitution Law.

$$x := e \equiv x' : e \land y' = y \land \ldots$$

$$x := e. \ P$$

$$\equiv \exists x', y', \ldots \ (x' : e \land y' = y \land \ldots) \land \text{(substitute } x'', y'', \ldots \text{ for } x, y, \ldots \text{ in } P)$$

$$\equiv \exists x'. \ x' : e \land \text{(substitute } x'' \text{ for } x \text{ in } P)$$

but the one-point law does not allow us to get rid of $\exists x''$. For example, in one variable,

$$x := 0, 1. \ x' = x + x$$

$$\equiv \exists x'. \ x' : 0, 1 \land \text{(substitute } x'' \text{ for } x \text{ in } x' = x + x)$$

$$\equiv \exists x'. \ x' : 0, 1 \land x' = x'' + x''$$

$$\equiv x' = 0 + 0 \lor x' = 1 + 1$$

$$\equiv x' : 0, 2$$

but the Substitution Law would give

$$\equiv x' = (0, 1) + (0, 1)$$

$$\equiv x' = 0, 1, 2$$